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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/634,912	08/09/2000	Naomasa Shimojoh	1344.1043/JDH	5324

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EXAMINER
CUNNINGHAM, STEPHEN C

ART UNIT	PAPER NUMBER
3663	12

DATE MAILED: 04/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/634,912	SHIMOJOH ET AL.	
	Examiner	Art Unit	
	Stephen C. Cunningham	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 February 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12,14 and 18-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5-12,14,18 and 22-35* is/are rejected.

7)☒ Claim(s) *2-4 and 19-21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 August 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claim 1, 18, 31, and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Kidorf et al.

With respect to claims 1 and 32, Kidorf et al. teach an optical amplifier comprising:

optical amplifying means amplifying a WDM signal using a rare earth doped fiber;

excitation light used has a wavelength capable of producing Raman amplification with respect to optical signals of said second wavelength band (l-band); and

amplifying means supplying excitation light which has Raman amplifying capable in the second wavelength band light to a Raman medium on a pre-stage side.

See figure 6, and column 4, lines 18-25, wherein pump light from pump source 673 pumps EDF 654 and is then supplied to fiber 634 on the pre-stage side of EDF 654 and therein produces Raman gain to signal light. The first and

second wavelength bands are any arbitrary sub-bands in the amplification range comprising more than 2 wavelengths in each band.

Raman amplification occurs at a wavelength approximately 100 nm longer than the pump wavelength. The detuned pump source pumps with a wavelength up to 1510nm, which results in amplification at approximately 1610 nm (L-band amplification).

With respect to claims 18 and 31, Kidorf et al. teach an optical amplifier comprising:

optical amplifying unit amplifying a WDM signal using a rare earth doped fiber;

excitation light used has a wavelength capable of producing Raman amplification with respect to optical signals of said second wavelength band; and

amplifying unit supplying excitation light which has Raman amplifying capable in the second wavelength band light to a Raman medium on a pre-stage side.

See figure 6, and column 4, lines 18-25, wherein pump light from pump source 673 pumps EDF 654 and is then supplied to fiber 634 on the pre-stage side of EDF 654 and therein produces Raman gain to signal light. The first and second wavelength bands are any arbitrary sub-bands in the amplification range.

2. Claims 33-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Ma et al.

With respect to claim 33, Ma et al teach an amplifier, amplifying is a c-band and an l-band comprising:

an optical amplifier, amplifying wavelength division multiplexed signal light which has a first and a second wavelength band, wherein,

said optical amplifier provides Raman amplification to optical signals of a second wavelength band on a pre-stage side, see figure 4, and column 2 line 30 through column 3, line 3 and column 1, line 64 through column 2, line 9. The Ma reference teaches maintaining a constant gain across the signal spectrum, indicating an inherent c/l ratio control section.

With respect to claim 34, Ma et al teach an amplifier comprising:

a demultiplexer providing first and second band outputs;

an amplifying unit that amplifies the second band;

a multiplexer that combines the first and the second band; and

maintaining a constant gain across the signal spectrum, indicating an inherent c/l ratio control section. See figure 4, and column 2 line 30 through column 3, line 3 and column 1, line 64 through column 2, line 9.

With respect to claim 35, Ma teaches an apparatus comprising:

an optical amplifier selectively amplifying the second wavelength band such that the spectral output is flat. The Ma reference teaches maintaining a constant gain across the signal spectrum, indicating an inherent c/l ratio control section. See figure 4, and column 2 line 30 through column 3, line 3 and column 1, line 64 through column 2, line 9.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 5 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kidorf et al. in view of Mitsuda et al.

Kidorf et al. teach amplifying means supplying part of said excitation light used in a amplifying section to a Raman producing medium. Mitsuda et al. teach, in figure 1,demultiplexing means demultiplexing the WDM signal into respective first and second bands, a preamplifier for amplifying both the first signal 51 and second signal 53 and a second erbium doped fiber amplifier 33 for amplifying only the second signal 53. It would have been obvious to further modify Kidorf et al. by substituting a first stage amplifying section leading to demultiplexing means leading to a second stage amplifying means for amplifying only the second wavelength band in order to provide high gain while limiting the active components needed for flattened gain amplification and to then multiplex the first and second signals so they may travel on the same transmission line.

4. Claims 6, 7, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kidorf et al. in view of Mitsuda et al. as applied to claim 5 and 22 above, and further in view of Sun et al. '11/97.

With respect to claim 6, Sun et al. teach an amplifier wherein the first wavelength band is a 1550 nm band and the second wavelength band is a 1580 nm band wherein a 1480nm excitation light in the first optical amplifying section.

With respect to claim 7, Kidorf et al. teach an optical amplifier comprising an erbium doped fiber, at least one excitation light source, and an optical coupler for supplying excitation light to said erbium doped fiber from a rear side, wherein a part of said excitation light is passed through said erbium doped fiber and supplied to said Raman amplification producing medium. Mitsuda et al. teach that the excitation light is 1480 nm. It would have been obvious to modify the apparatus by supplying an excitation light of 1480 nm in order to provide efficient amplification in erbium doped fiber.

5. Claims 8 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kidorf et al.

Official Notice is taken that optical fiber with a small cross section increases Raman amplification. It would have been obvious to use a fiber with a small nonlinear cross section compared to a 1.3 zero dispersion single mode fiber in order to increase Raman amplification.

6. Claims 9 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kidorf et al. in view of Antos et al.

Antos et al. teach the use of dispersion compensating fiber. It would have been obvious to modify Kidorf et al. to include dispersion compensating fiber to compensate for chromatic dispersion.

7. Claims 10-12 and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kidorf et al. as applied to claim 1 above, and further in view of Kosaka et al.

With respect to claims 10 and 27, Kidorf et al. fail to teach the use of control means. Kosaka teaches the use of power constant control means. It would have been obvious to further modify Kidorf et al. to add power constant control means to an optical amplifier to prevent power transients.

With respect to claims 11 and 28, Kosaka teaches the use of gain constant control means. It would have been obvious to add gain constant control means to an optical amplifier to prevent gain ripple due to fluctuations in the gain spectrum.

With respect to claims 12 and 29, Kosaka teaches the use of supervisory control means for processing a supervisory control (probe) signal transmitted together with the wavelength division multiplexed signal light. It would have been obvious to add supervisory control means to an optical amplifier to monitor the system.

8. Claims 14 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kidorf et al. in view of Mitsuda et al. as applied to claim 5 above, and further in view of Kosaka.

Kidorf et al. and Mitsuda et al. fail to teach the use of power monitor means and the use of power control means. Kosaka teaches the use of power monitor means and the use of power constant control means. It would have been obvious to further modify Mitsuda add power monitor means and power constant control means to an optical amplifier. Kosaka teaches the use of control means for correcting the difference between the output signals of different wavelengths.

Allowable Subject Matter

Claim 2-4 and 19-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The nearest prior art is Ma et al. PN 6,151,160 which teaches an optical amplifier comprising a pre-stage Raman amplifier, followed by a split-band amplifier. The Ma reference fails to teach supplying residual pump light from one of a plurality of parallel amplifiers in order to provide Raman amplification in a signal band different from the amplifier that supplied the pump light.

Response to Arguments

- The applicant argues that the instant application teaches an amplifier that amplifies WDM light of a c-band and an l-band, wherein the second wavelength band has been selectively Raman amplified. The term

"selectively" does not limit the claims, only one wavelength may be selected or all wavelengths may be selected.

- The applicant also argues that the instant invention emphasizes balance control of the wavelength bands, however the independent claims do not contain limitations regarding balance control.
- The applicant argues that the Kidorf reference teaches away from the present invention because the instant invention teaches independent amplification of the c and l bands whereas the Kidorf reference teaches a unifies band amplification. In the independent claims there are no limitations that indicate split band amplification. There are only limitations teaches a generic amplifying means and a Raman amplifying means.
- The applicant argues that the amendment incorporating a C/L ratio control section is patentable over Ma et al. The Ma reference teaches a split band amplifier wherein each band is amplifier to equalize gain over the full signal spectrum. This suggests some mechanism for controlling parallel gain stages to maintain a constant ratio.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen C. Cunningham whose telephone number is 703-605-4275. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G. Black can be reached on 703-305-8233. The fax phone

numbers for the organization where this application or proceeding is assigned are 703-872-9326 for regular communications and 703-872-9327 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.

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March 24, 2003

THOMAS G. BLACK
SUPERVISORY PATENT EXAMINER
GROUP 3600